FOOD PLANTS AND YOU

by

WINONA COSNER
Raymond Foundation

Museum Stories, Number 158

March 6, 1948

Food Plants and You

Endless cement streets, skyscrapers, streetcars, busses, screeching brakes, trolley bells, tooting horns—these are the city. Thousands upon thousands of people keep the city going—doctors, bus drivers, teachers, elevator operators, and countless others. This is a world of power, of turning wheels, and of machinery in motion. To produce this power, furnaces and machines must have fuel. Their fuel is usually coal.

Man, too, needs fuel. His fuel is food. In the city he gets his fuel at the corner grocery. In cans or boxes, frozen or fresh, it all has come from the farms of the nation. Man with all his science and inventions still cannot make his own food. He is completely dependent on nature to do it for him. Every bit of man's food comes from plant life.

Now maybe you are thinking that we don't have to eat plant food but instead could live on milk, eggs, fish, and meat. If you were thinking that, now ask yourself this question: Where did that meat come from? Yes, it was an animal. But what did that animal eat? It probably depended almost entirely on plant food. However, even if it also ate meat, that meat was once an animal that had eaten plants. If you search back far enough, you will always find that somewhere plant life was the food. So, you see, even meat eaters are really dependent on plants.

Plants are living things, and they too need food. What is their food? They make their own. It is made from air, water, minerals dissolved in the water, and sunlight. Plants and only plants have this amazing ability to make their own food. They alone can transform air, water, certain elements, and the energy of the sun into life. They alone have a substance that makes

possible this life-giving process. That wonderful material is chlorophyll. Chlorophyll is the green substance in the leaves and stems of plants.

A plant's green leaf is a factory that takes the raw materials, air, water, and certain elements, and, in the presence of sunlight, manufactures them into food. This food is a kind of sugar, and it is soon deposited throughout the plant. In many plants the sugar is changed to starch. Some of these plant sugars are changed into fats and oils and, with certain additions, into proteins. These plant sugars, starches, oils, fats, and proteins are the food of man and animals.

Civilization and agriculture have developed together. Earliest man hunted animals to supply the main part of his diet. Whatever plant life he ate was that which grew wild. Later he learned to store plant foods to tide him over bad weather and seasons of poor hunting. His discovery of how to grow food plants from seeds was the beginning of agriculture. Now he no longer had to follow the roaming game. He could stay in one place, and this, then, was the beginning of civilization.

Pioneers in any land must either live off the new land or bring their own foods and seeds with them. The pioneers in New England found foods very different from those they had always used. They knew nothing about corn, which was the staple food of the Indians. Except for the Indians' instructions on how to raise this strange product those pioneers might never have survived their first year in America. As America grew, its new settlers brought along their favorite foods. Many of the foods now grown on our farms have originated in other parts of the world. Our civilization may become more and more complicated but it is still completely dependent on the silent, secret processes that go on in plants.

This page is for your own notes and illustrations

SUGARS OF MANY KINDS

by

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Sugars of Many Kinds

Bees were, no doubt, the first collectors of sugar. They gathered neetar from flowers and made it into honey long bcfore any people knew of sugar.

All plants have some sugar in them. With the aid of sunshine the plant manufaetures this food, sugar, in its green leaves from water, eertain elements, and air. Sugar dissolves easily in the watery plant juiccs and is earried into all parts of the plant for nourishment. Many plants produce morc sugar than they need for their own nourishment, and this surplus is the primary food of all living organisms, including people.

This extra supply of sugar in plants may not remain as sugar. It is oftcn earried to the roots of the plants where it is ehanged into starch and stored away for future use (example, potato). It may also be ehanged into fats and oils, as in nuts, and it is the basis for the formation of proteins (example, beans). So again it is proved that sugar is the most important food. Without it no other foods could be manufactured in plants and without it no animals, plants, or people could exist.

Thcre are several kinds of sugar, some sweeter than others. "Grape" sugar (dcxtrose or glucose) is not very sweet; it is espeeially valuable to pcople with diabetes. "Fruit" sugar (fruetose) is probably the swcctest of sugars. "Cane" sugar (sucrose) is the commonest sugar for household use; it is found in sugar eane, sugar beets, sorghum, and sugar maple. All fruits contain at least two of these sugars and some eontain all in varying amounts. Fruits espceially rieh in sugar are apples, pineapples, strawberries, watermelons, grapes, raisins, dates, prunes, and figs.

For a long time man was probably satisfied to rob the combs of the honey bees for sugar. Then he learned to obtain it by squeezing out the sweet juiees of eertain

plants and boiling them down into sugar. No one knows whether this first happened in India or China or how long ago it was. Sugar is a Persian word that comes from the Sanskrit word "shahara" or "sarkara" meaning "small grains." Theophrastus later spoke of it as "honey which is from bamboo." Sugar was not used as food then. People regarded it as a sort of curiosity and presented it to royalty.

We know today that sugar is a necessity. The two most important plants from which we get our supply are the sugar cane and sugar beet.

There are other sources of sugar more or less limited to the small regions where the plants grow. Take for instance the palm sugar made especially from the nipa and wild date palms. For years natives in certain tropical lands have made sugar from the sap of wild date palms and the sap of the unopened flower buds of the nipa palms. Maple sugar is an American product and was first made by the North American Indians long before the time of the white people. Our first colonists learned to make this sugar from the sap of the sugar-maple tree and it soon became an important staple food. White sugar was then a luxury bought in Boston at seventy-five cents a pound. It came in large white cones and was used only on special occasions. Today white sugar is common and maple sugar a luxury.

Bees were, no doubt, the first collectors of sugar.

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CHOCOLATE OR CACAO

by

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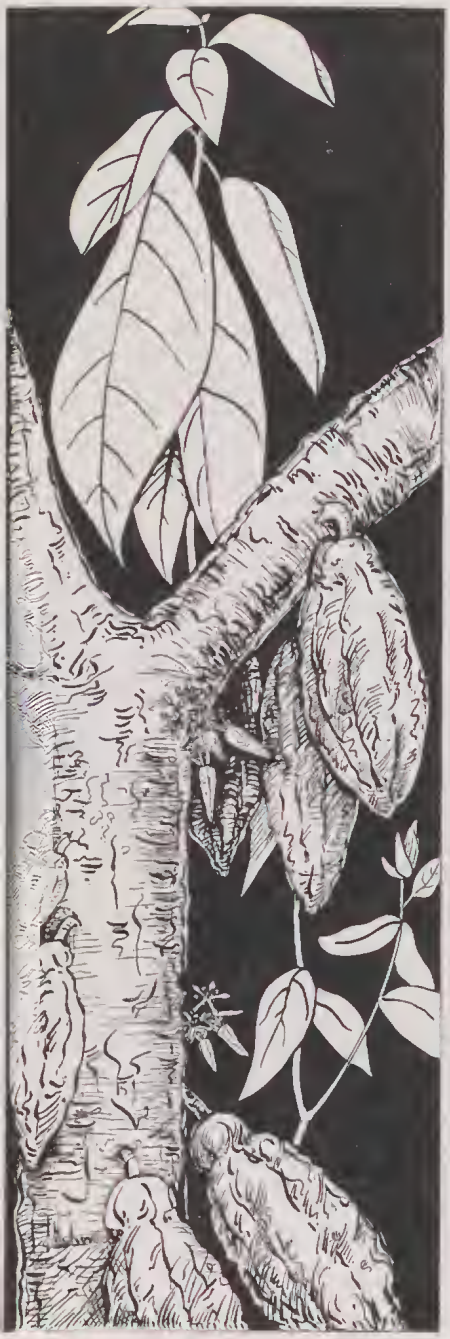
Chocolate or Cacao



Chocolate, either as candy or a drink, is familiar to almost every person throughout the world. Chocolate is not a new substance. It is as old as the ancient Incas and Aztecs of South America and Mexico.

Mention of "chocolatl" or the cacao tree from which it came was made frequently in the old stories about Cortez and his conquest of Mexico. Montezuma, who was ruler of Mexico at that time, was especially fond of "chocolatl" to drink. It was said that he took no other beverage than "chocolatl," which was made from ground cacao beans flavored with vanilla, honey, and spices and beaten until it was covered with foam. Fifty golden pitchers of chocolate were served to Montezuma every day; two thousand more jars of it were prepared for his household each day. Montezuma drank the chocolate from golden goblets aided by spoons of gold or finely carved tortoise shell and each golden cup, after being drained, was tossed into a lake that was close by.

The flowers grow in clusters from small cushions on the trunks and larger branches of the trees.

Ever since those early days cacao has been very important in Mexico and South America. The beans have been used for money; they were the usual small change in Mexican markets and were used in some places until 1850. In the last few centuries the importance of cacao has spread until now great plantations exist in Africa, Trinidad, and other tropical countries.

When cacao trees are three or four years old they begin to flower. The very small flowers, yellow or pink, are delicate, star-shaped, and not fragrant. They grow in clusters from small cushions on the trunks and larger branches of the trees. It takes about four months for the blossoms to develop into fruits. As the trees bloom continuously, blossoms and fruits are found on the trees all through the year. If proper care is taken, a cacao tree will produce fruit for fifty or more years.

The fruits ripen into fairly large, brown, oval-shaped pods. These cacao pods are filled with twenty to forty cocao beans imbedded in soft, white pulp. The pods are split open and the beans are removed and piled up to ferment. Then they are dried, cleaned, and shipped to the manufacturers of chocolate products. There the outer shells are removed and the kernels taken out and roasted. Roasting takes away some of the bitter taste. The kernels are then put through grinding machines. They come out in the form of a dark brown paste that is molded into the cakes we call "bitter chocolate." To produce the powdery cocoa, the kernels are ground up and put through a pressure machine that squeezes out about half of the fat or cacao butter.

The familiar candy bars usually contain only about forty-five per cent of chocolate while the remainder is sugar, milk, and flavoring material. The great botanist, Linnaeus, was fond of chocolate, and perhaps because of this he gave the cacao tree the dignified and fitting name of "Theobroma," which means "food of the gods."

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FRUITS AND VEGETABLES

by

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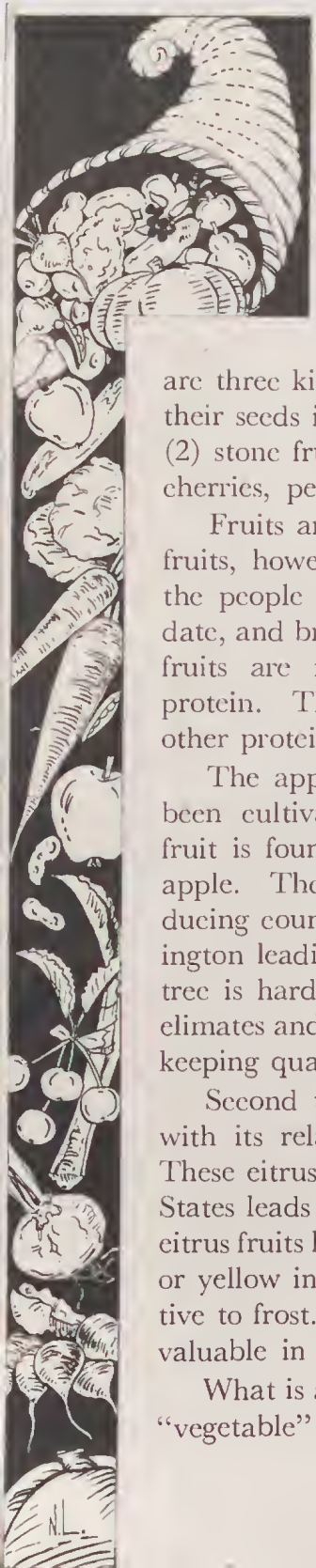

Fruits and Vegetables

Fruits, as well as vegetables, have been important in man's diet since the beginning of civilization. What is a fruit? Generally speaking, a fruit is that part of a plant that bears seeds. There are three kinds of fruits: (1) fleshy fruits, which have their seeds in the pulp (apples, oranges, cucumbers); (2) stone fruits, which contain pits or stones (plums, cherries, peaches); and (3) dry fruits (beans, nuts).

Fruits are found growing all over the world. All fruits, however, are not used in the same way. To the people of the tropics, the banana, fig, coconut, date, and breadfruit are staple articles of food. These fruits are nourishing because they contain much protein. They are used as substitutes for meat and other protein foods.

The apple is the most popular of fruits and has been cultivated from prehistoric times. No other fruit is found growing over as great an area as the apple. The United States is the greatest apple-producing country of the world, with the state of Washington leading all other states in output. The apple tree is hardy. It is able to grow in many different climates and in many kinds of soil. Its fruit has good keeping qualities.

Second to the apple in popularity is the orange, with its relatives, the lemon, lime, and grapefruit. These citrus fruits are tropical plants; yet the United States leads the world in citrus fruit production. All citrus fruits have thick oily rinds that are bright orange or yellow in color. Citrus fruits are extremely sensitive to frost. Vitamin C, found in all citrus fruits, is valuable in preventing and treating colds.

What is a vegetable? Frequently we use the word "vegetable" in place of the word "plant"—for example,

"vegetable" kingdom. Vegetables may be any part of the plant—the leaf stalk (rhubarb, celery), the leaves (spinach, lettuce, cabbage), or the root (carrots, beets, radishes). The root vegetables are especially high in energy value.

The onion is one of the most widely used of vegetables. Although it neither looks nor smells like the Easter lily, the onion is closely related to it. The people of ancient China and India enjoyed the onion's pungent taste just as we do today and served onions both raw and cooked. Closely related to the onion and used for the same purpose are garlic, leeks, shallots, and chives.

Some plant parts, such as peas, beans, tomatoes, peppers, okra, squashes, and avocados, are popularly known as vegetables although they are really true fruits. These "fruit vegetables" are used in salad dishes and main-course dishes. Probably the most popular of these foods is the tomato. Once known as the "love apple," the tomato was long considered poisonous and was grown only for ornamental purposes. When people learned that the tomato was not poisonous it became very popular. Today, tomatoes are used in a greater variety of ways than any other vegetable.

Vegetables are particularly nutritious because of their high vitamin and mineral content. Vitamins and minerals are substances found in many foods. They are necessary for the normal functioning of the body as well as for the development of sound teeth, bones, and other structures. The greater part of many vegetables is made up of water and much smaller amounts of sugar and starch. Because vegetables contain so much water they are sensitive to weather changes and tend to spoil easily.

Fruits and green vegetables should have a place in every meal. Not only are these foods valuable in furnishing one's body with vitamins and minerals but they also give back much of the water lost through perspiration.

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STARCHES THAT WE EAT

by

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Raymond Foundation

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Starches That We Eat

When we eat potatoes we are eating the food that the growing potato plant had set aside as starch for its own future use. The potatoes we eat are the plant's swollen stems, which we call "tubers." From water, air, certain minerals, and sunlight, the leaves of the growing plant manufacture sugar. During the growing season extra sugar is made. This extra sugar is moved to a storage place where most of it is changed into starch and some of it into fats and proteins. When the plant needs to use this stored food it will be changed back to sugar and taken wherever needed.

Starch is perhaps the most widely distributed substance in the plant kingdom and occurs, often in great abundance, in almost every plant. Plants usually store starch in stems (as in the white potato), roots (as in the sweet potato), bulbs, or seeds. Cereal grains have much starch, but there are also other important starches that are staple foods of many people of the world.

When the Spanish explorers went into Peru and Chile four hundred years ago, they found the natives cultivating and eating potatoes. These Spaniards introduced the potato into Europe and, later, settlers from Europe brought it to North America. Thus it came to us the long way around rather than directly from the South American countries.

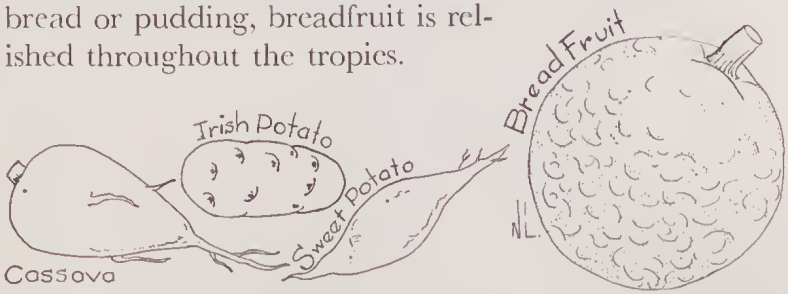
Everywhere the potato went its popularity grew rapidly. It has even played important roles in history, for the quick-growing potato often came to the rescue when the staple cereal crops were slow to reach the harvest or when they failed entirely. In overpopulated Ireland the soil and cool climate were ideal for potato raising, and potatoes became the Irish staple. When the potato crop of 1845 failed, a terrible famine occured, resulting in a great Irish immigration to the United States. The white potato is now popularly known as the

"Irish" potato. In planting a new crop, potatoes themselves are used, for new plants grow from the eyes of the potato, which are really the buds of the plant.

The potato of warm climates is the sweet potato, which belongs to a different family than the Irish potato. It stores up more sugars and fats along with the starch. In the South some varieties are called yams, but the true yam represents still another plant family, which is seldom grown in the United States.

The cassava is an important source of staple starch food in South America. Its milky roots may grow to be three feet long and over half a foot across. "Tapioca" is the starch that has been separated from the cassava plant and heated until the granules burst into pellets.

The Pacific islands have several unique staple starch foods. Among them are taro, sago, and breadfruit. Taro, like the potato and cassava, is a tuberous plant. Sago comes from a palm tree. The pith in the center of the tree trunk supplies the edible starch from which is made the fine pearly grains known as "pearl sago." Sago is eaten in the form of cakes or soup by the natives, to whom it is an important article of everyday diet. The sago tree blooms just once, when it is fifteen years old, at which time it uses up its starchy pith and then dies. Natives cut the tree just as it is ready to flower and therefore just in time to collect the pith, which may amount to seven hundred pounds in a single tree. The large pulpy fruit of the breadfruit tree is prepared in a variety of ways. Boiled, baked, dried, crushed, or in bread or pudding, breadfruit is relished throughout the tropics.



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CEREALS NOT JUST FOR BREAKFAST

by

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Raymond Foundation

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April 10, 1948

Cereals Not Just For Breakfast

In the summer a visitor to our great plains states marvels at the miles of golden grain fields gently rippling in the breeze. This is more than just a beautiful sight, for these acres and acres of grains are vital to people all over the world. The important grains are corn, wheat, rice, barley, rye, and oats. Cereal grains are used in countless products, but only a very small percentage of the world's supply of cereal grains is consumed as breakfast foods.

Cereals are members of the large family of flowering plants that we call grasses. We eat the seeds, which have unusually high food values. Different cereals grow under many different soil and weather conditions. From the tropics to the Arctic Circle, from sea level to high mountains, different cereal grains have found suitable growing conditions and have become the major part of the local diet. Almost the only people of the world who now lack staple cereal grains are those of the islands of the Pacific. There the coconut palm and other tropical foods take the place of cereal grains on native menus.

The most truly American cereal is corn, for it originated in the Americas, and most of it is raised in the Americas. The staples of the Indians and pioneers were foods prepared from corn—hominy, corn-meal mush, corn pone, and others. The task of husking corn was accompanied with contests, games, and much fun, so that cornhusking became a community project of early United States.

A few of the many kinds of corn are popcorn with its tough outer coat over the kernel, sweet corn that we eat on the cob or from the can, and the corn that is used as fodder. Most corn is used as food for livestock right on the farm where it is grown. The corn crop of the United States is greater in volume and value than the combined crops of wheat, oats, barley, rye, rice, and buckwheat. Corn is used in more products than any other cereal. Different parts of the plant are used for everything from corn meal to mattress stuffing and fuel.

Wheat is the most important cereal of the Old World temperate regions today, just as it was in ancient times. White bread, the world's most popular bread, is made from wheat flour. Rice, the Oriental "staff of life," is the main food of more than half the world's population. However, because it is almost pure starch and not a complete food, the rice diet of the Asiatics is often supplemented with more nourishing soybeans.

Barley, man's oldest cereal, is a very hardy plant. It is grown nearly to the Arctic Circle, and much of it is produced in Russia. Centuries ago barley was the chief source of bread flour. Now its chief uses are as food for livestock, breakfast foods, and malt. Rye grows well in soils too poor and climates too cold for other cereals. Its black bread has long been the principal food of Central Europe.

The cereal with the greatest food value is oats. Although it is made into oatmeal and other breakfast foods, most of it is used as food for livestock. Sorghum and millet are names used for a number of grains from different parts of the world. The sweet sorghum of southern United States is used for fodder and syrup.

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"MEAT" FROM PLANTS

by

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"Meat" from Plants

Meat, eggs, and milk are often regarded by many people as the only foods that contain protein, an important food substance without which the body would be unable to build up new tissue. In certain parts of the world, especially the Mediterranean area, Mexico, and Central and South America, these foods are either far too expensive to be purchased by the poorer people or they are not obtainable. Legumes, such as peas and beans and nuts, are therefore used as meat substitutes.

The best-known and certainly one of the most nutritious legumes is the peanut, which is not a true nut but a bean-like legume enclosed in a pod. Rich in oils and protein, the peanut is not only an ideal food for human beings, but it is also a valuable food for cattle. From the peanut we get peanut butter for our sandwiches, peanut oil for our salad dressings, and oil for making soap and margarine. The peanut vine, the hull or shell, and the thin skin that covers the peanut itself may be used instead of hay as fodder for cattle.

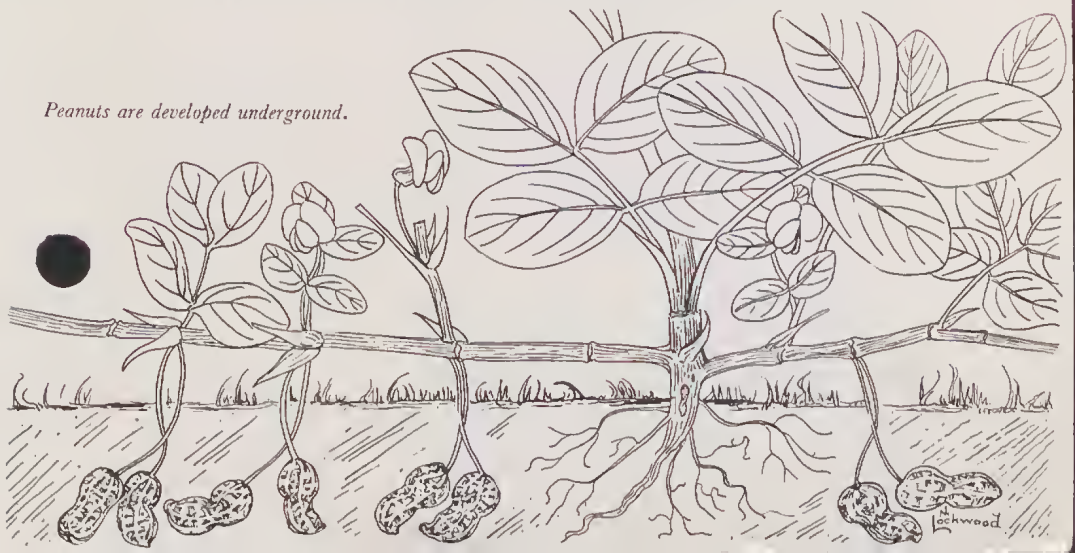
The food value of peanuts is particularly high. One pound of peanuts gives us more protein than a pound of steak, more carbohydrates than a pound of potatoes, and approximately as much fat as a pound of butter. Peanuts can be kept for several years without spoiling, whereas meat and dairy products spoil quickly. The peanut is also notable because it is one of the few plants that produce true fruits underground. As soon as the flowers have fallen, the flower stalks droop and push into the soil. The peanuts are developed underground.

Another legume that has become increasingly important in recent years is the soybean. Cultivated for hundreds of years in China and Japan where today it is the most important legume, the soybean was introduced into the United States a little over a century ago. The soybean has many uses. It contains oil that is used

in making soap, rubber and celluloid substitutes, enamel, and candles. It supplies us with flour, coffee and butter substitutes, and breakfast foods. It furnishes the farmer with nourishing food for his cattle.

All growing plants absorb food from the soil. If certain crops are planted year after year in the same soil, the food content of the soil gets lower and lower and the quality of the food crops gets poorer. It is necessary then to give the soil a "rest" and even more important to restore to the soil vital food materials so that the soil can again produce rich crops. This can be done by adding natural or artificial fertilizers to the soil. Certain plants, especially legumes, are capable, with the aid of soil bacteria, of storing in their roots an essential food substance found in the air. When the legume crop is harvested, the roots left in the soil decay, thereby releasing to the soil this plant food, called nitrogen.

Thus the legume or pea family is of great agricultural importance to man. Among the many contributions of this plant family, a few of the more outstanding are the following: wholesome yet inexpensive foods like peas and beans; essential oils like peanut and soybean oil; necessary and inexpensive fertilizing crops like clover and alfalfa; nourishing food for cattle; and ornamental garden plants like sweet peas and honey locust trees.



Peanuts are developed underground.

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FOOD OILS FROM PLANTS

by

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Raymond Foundation

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April 24, 1948

Food Oils from Plants

You are familiar with odors from plants—the sweet fragrance of roses, the spicy odor of geranium leaves, and the strong odor of onions. Many of these plant odors are caused by oils in the plants, and some of these oils are important sources of foods.

Throughout history all over the world vegetable oils have been removed from plants to serve in many ways. Many of the oils are important foods: for example, the oils that are used for cooking, for salad and vegetable dressings, and for packing canned fish. Some vegetable oils serve as medicines—many children know from experience the oil that comes from the castor bean. Some oils, including the few that cannot be eaten, are used in making soap, paint, perfume, fuel, and candles.

The growing plant manufactures extra food, and some of this is stored as fats and oils. Oils are found in most parts of most plants, but certain fruits and seeds contain especially large amounts. Some of the world's most popular oils are from the seeds of the poppy, soybeans, corn, cotton, peanuts, coconuts, and olives.

An old and crude method of removing oil from plants is to pile the parts containing the oils in the sun. The heat causes the oils to separate and run off. This method is still used in some parts of the world.

In the western world the best-known and oldest vegetable oil is olive oil. In ancient times the olive was so important in the areas around the Mediterranean Sea that the olive branch became the symbol of peace and plenty. For many people olive oil still takes the place of butter and animal fats, as in Spain and Italy, which produce more olives than all the rest of the world.

The coconut palm tree of the tropics has an almost endless number of uses. Copra, the dried coconut meat, is rich in oil. Undoubtedly as long as human beings

have lived where the coconut palm grows, the oil has been extracted and used for food and body oils. In world commerce, coconut oil is used chiefly in manufacturing soap and margarine.

Just as olive oil in the Mediterranean regions and coconut oil in the tropics are staple articles of diet, so are other vegetable oils elsewhere. Examples are soybean oil in Manchuria, palm oil in West Africa, and babassu oil in the jungles of Brazil.

In the United States by far the largest source of vegetable oils is the cotton plant. Years ago seeds removed from the raw cotton were piled up in dumps until they became a health menace and laws had to be passed to have them destroyed. After a method was developed for extracting the oil from the seeds more and more uses were found for it, until now enough is made to supply over ten pounds of oil a year to every man, woman, and child in the country. The meal remaining after the oil is removed from the seeds is an important food for livestock. From peanuts, too, comes a useful oil. Peanut oil is used in shortening and other foods as well as for lubricating everything from fine watches to heavy tractor motors.

We no longer have to travel around the world to see these oil-giving plants. Most of them have been introduced and are now grown in the United States.

A primitive olive press, in northern Africa.

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